

REMARKS

This paper is being provided in response to the October 24, 2002 Final Office Action for the above-referenced application. In this response, Applicants have amended Claims 10-14 in order to clarify that which Applicants deem to be the invention. Applicants respectfully submit that the modifications to the Claims are supported by the originally-filed application.

The rejection of Claims 10-14 under 35 U.S.C. 103(a) as being unpatentable over Small (U.S. 5,981,454, hereinafter referred to as "Small") and Tanabe et al. (U.S. 6,068,000, hereinafter referred to as "Tanabe") is hereby traversed and reconsideration thereof is respectfully requested. Claims 10-14, as amended herein, are patentable over the references, taken separately or in combination.

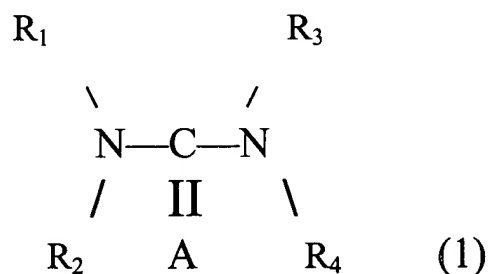
Claim 10, as amended herein, recites a stripping method. A resist film on a semiconductor wafer having an exposed metal film is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components.

Claim 11, as amended herein, recites a stripping method. A resist film on a semiconductor wafer having an exposed metal film is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent

selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass, 0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively.

Claim 12, as amended herein, recites a stripping method. A resist film on a semiconductor wafer having an exposed metal film is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,

wherein the component (a) is a compound represented by the following general formula (1):



(R₁, R₂, R₃ and R₄ are each independently a hydrogen atom or an alkyl group having 1 to 3 carbon atoms; and A is an oxygen atom or a sulfur atom).

Claim 13, as amended herein, recites a stripping method. A resist film on a

semiconductor wafer having an exposed metal film is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, having a benzene derivative having at least two phenolic hydroxyl groups in the molecule, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components.

Claim 14, as amended herein, recites a stripping method. A resist film on a semiconductor wafer having an exposed metal film is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components. The component (b) is a benzene derivative having at least two phenolic hydroxyl groups in the molecule having at least one compound selected from the group consisting of pyrogallol, hydroxyhydroquinone, fluoroglucinol, gallic acid and tannic acid.

Small discloses a composition for removal of chemical residues from metal or dielectric surfaces or for chemical mechanical polishing of a copper surface. (See Abstract; Col. 2, Lines 37-40). The residues removed are either particulates or post etch residue such as chemicals that may cause corrosion if not removed. The solution used is aqueous with an acidic nature with various salts, acids and amines added to make the solution into an oxidizing material. (Col. 3, Line 40-Col. 4, Line 25).

Tanabe discloses a substrate treatment method performed after forming the resist pattern on a substrate and etching the resist. (See Abstract; Col. 1, Lines 5-15). Tanabe discloses using a rinsing solution of water and a water-soluble organic solvent after a removing treatment using a hydrofluoric acid-based remover solution. (Col. 2, Lines 36-44; Col. 3, Lines 3-8). Tanabe discloses that an additional anticorrosive may be included in the lithographic rinsing solution. (Col. 6, Lines 10-18).

Applicants' Claim 10, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components*, as set forth in Applicants' amended Claim 10. Small is silent on disclosing any use of a water soluble organic solvent. Tanabe discloses using a water soluble organic solvent but only to remove etchant remaining after performing the steps of forming a resist and etching the resist. Tanabe is silent on using the water soluble organic solvent to strip a resist film. Accordingly, the references neither disclose nor suggest the feature of *a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides,*

glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' amended Claim 10.

Tanabe makes no mention of using the water soluble organic solvent for stripping a resist film. The disclosure in Tanabe related to removing any remaining wet etchant residue of hydrofluoric acid does not teach, suggest, or discloses using the water soluble organic solvent in stripping a resist film due to the very different considerations for the chemical reactions and components.

Furthermore, Applicants respectfully submit that the Office Action sets forth insufficient motivation as to why one of ordinary skill in the art would be motivated to combine Tanabe with Small. The Office Action states that it would be obvious to add a water-soluble organic solvent in light of Tanabe because Tanabe teaches that it would exhibit a high anticorrosive effect for metallic films. Applicants respectfully submit that Tanabe does not teach, disclose or suggest that the water soluble organic solvent is anticorrosive. Rather, Tanabe teaches that remover solutions are corrosive to the conductive metal film on a substrate and accordingly should be removed. (Col. 1, Lines 28-41). Applicants respectfully submit that Tanabe teaches away from the use of a water soluble organic solvent as anticorrosive since Tanabe discloses adding a separate component to the rinsing agent as an anticorrosive. (Col. 3, Lines 52-56; Col. 4, Lines 30-34).

Applicants further respectfully submit that one of ordinary skill in the art would not look to the teachings Tanabe for determining a stripping method for stripping a resist film, as in Applicants' amended Claim 10, because Tanabe discloses removing an etching residue of

hydrofluoric acid and makes no mention of stripping a resist film.

In view of the foregoing, Applicants respectfully submit that amended Claim 10 is patentable over the references.

For reasons similar to those set forth regarding Claim 10, Applicants' Claim 11, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination. Applicants' amended Claim 11 is patentable over the references in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass, 0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively,*** as set forth in Applicants' amended Claim 11.

For reasons similar to those set forth regarding Claim 10, Applicants' amended Claim 12 is neither disclosed nor suggested by the references. Applicants' Claim 12, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components ...,*** as set forth in Applicants'

amended Claim 12.

For reasons similar to those set forth in connection with Applicants' amended Claim 10, Applicants' amended Claim 13 is neither disclosed nor suggested by the references. Applicants' Claim 13, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components***, as set forth in Applicants' amended Claim 13.

For reasons similar to those set forth regarding Applicants' amended Claim 10, Applicants' amended Claim 14 is neither disclosed nor suggested by the references. Applicants' Claim 14, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components***, as set forth in Applicants' amended Claim 14.

In view of the foregoing, Applicants respectfully submit that Claims 10-14 are patentable over the references and request that the rejection be reconsidered and withdrawn.

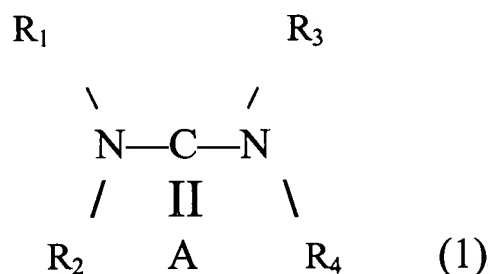
The rejection of Claims 16-20, 22-26, 28, and 29 under 35 U.S.C. 103(a) as being unpatentable over Small, Tanabe and Zhao et al. (U.S. 6,204,192, hereinafter referred to as "Zhao") is hereby traversed and reconsideration thereof is respectfully requested. Claims 16-20, 22-26, 28, and 29 are patentable over the references, taken separately or in combination.

Claim 16 recites a stripping method. Formed on semiconductor wafer are a metal film and an insulating film in this order. A resist film is formed thereon. Dry etching is conducted with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film. The resist film and/or the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine or an alkanolamine, (d) water, and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components.

Claim 17 recites a stripping method. Formed on a semiconductor wafer are a metal film and an insulating film in this order with a resist film formed thereon. Dry etching is conducted with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film. Then, the resist film and/or the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine or an alkanolamine, (d) water, and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass,

0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively.

Claim 18 recites a stripping method. Formed on a semiconductor wafer are a metal film and an insulating film in this order with a resist film formed thereon. Dry etching is conducted with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film. Then, the resist film and/or the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the component (a) is a compound represented by the following general formula (1):



(R₁, R₂, R₃ and R₄ are each independently a hydrogen atom or an alkyl group having 1 to 3 carbon atoms; and A is an oxygen atom or a sulfur atom).

Claim 19 recites a stripping method. Formed on a semiconductor wafer area metal film and an insulating film in this order with a resist film formed thereon. Dry etching is conducted with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film. Then, the resist film and/or the residue of etching is stripped by using a stripper

composition containing an anticorrosive agent which contains (a) urea or a urea derivative and (b) a hydroxy aromatic compound, having a benzene derivative having at least two phenolic hydroxyl groups in the molecule, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components.

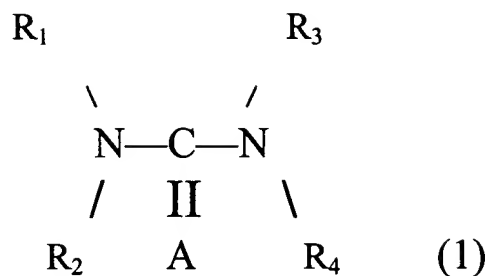
Claim 20 recites a stripping method. Formed on a semiconductor wafer are a metal film and an insulating film in this order with a resist film formed thereon. Dry etching is conducted with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film. Then, the resist film and/or the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, wherein the component (b) is a benzene derivative having at least two phenolic hydroxyl groups in the molecule having at least one compound selected from the group consisting of pyrogallol, hydroxyhydroquinone, fluoroglucinol, gallic acid and tannic acid.

Claim 22 recites a stripping method. Formed on a semiconductor wafer are a metal film, a first insulating film and a second insulating film having desired openings. Dry etching is conducted with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film. Then the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine or an alkanolamine, (d) water and (e) a water

soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components.

Claim 23 recites a stripping method. Formed on a semiconductor wafer are a metal film, a first insulating film and a second insulating film having desired openings. Dry etching is conducted with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film. Then the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine or an alkanolamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass, 0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively.

Claim 24 recites a stripping method. Formed on a semiconductor wafer are a metal film, a first insulating film and a second insulating film having desired openings. Dry etching is conducted with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film. Then the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, wherein the component (a) is a compound represented by the following general formula (1):



(R₁, R₂, R₃ and R₄ are each independently a hydrogen atom or an alkyl group having 1 to 3 carbon atoms; and A is an oxygen atom or a sulfur atom).

Claim 25 recites a stripping method. Formed on a semiconductor wafer are a metal film, a first insulating film and a second insulating film having desired openings. Dry etching is conducted with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film. Then the residue of etching is stripped by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative and (b) a hydroxy aromatic compound, having a benzene derivative having at least two phenolic hydroxyl groups in the molecule, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components.

Claim 26 recites a stripping method. Formed on a semiconductor wafer are a metal film, a first insulating film and a second insulating film having desired openings. Dry etching is conducted with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film. Then, the residue of etching is stripped by using a stripper

composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the component (b) is a benzene derivative having at least two phenolic hydroxyl groups in the molecule having at least one compound selected from the group consisting of pyrogallol, hydroxyhydroquinone, fluoroglucinol, gallic acid and tannic acid.

Claims 28 and 29 depend from, respectively, Claims 10 and 11. For reasons set forth above, Claims 10 and 11, and claims that depend therefrom, are patentable over Tanabe and Small. For reasons set forth below, combining Tanabe and Small with Zhao also neither discloses nor suggests Applicants Claims 10 and 11, and claims that depend therefrom.

Small and Tanabe are summarized above.

Zhao is cited in the Office Action to show that the steps of patterning the dielectric layer to expose the metal layer included in the steps of forming a metal film, first dielectric film and resist or second dielectric film, and etching the first dielectric layer using the resist film as a mask to expose the metal layer are known in the art.

Applicants' Claim 16 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film*

being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants'

Claim 16. Small and Zhao are silent on disclosing any use of a water soluble organic solvent.

Tanabe discloses using a water soluble organic solvent, but discloses using this in a step performed to remove hydrofluoric acid remaining after forming a resist pattern and wet etching the resist, rather than to strip a resist film or the residue of dry etching. Accordingly, the references neither disclose nor suggest the feature of *a stripping method which comprises:*

forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 16.

For reasons similar to those set forth regarding Claim 16, Applicants' Claim 17 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue*

of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 17.

For reasons similar to those set forth regarding Claim 16, Applicants' Claim 18 is neither disclosed nor suggested by the references. Applicants' Claim 18 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' Claim 18.*

For reasons similar to those set forth regarding Claim 16, Applicants' Claim 19 is also neither disclosed nor suggested by the references. Applicants' Claim 19 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a*

stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 19.

For reasons similar to those set forth regarding Applicants' Claim 16, Applicants' Claim 20 is neither disclosed nor suggested by the references. Applicants' Claim 20 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 20.*

For reasons similar to those set forth regarding Applicants' Claim 16, Applicants' Claim 22 is neither disclosed nor suggested by the references. Applicants' Claim 22 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the*

residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants Claim 22.

For reasons similar to those set forth regarding Applicants' Claim 16, Applicants' Claim 23 is neither disclosed nor suggested by the references. Applicants' Claim 23 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' Claim 23.*

Applicants' Claim 24 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected*

from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 24.

Applicants' Claim 25 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 25.*

Applicants' Claim 26 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants'*

Claim 26.

With regard to amended Claim 10, adding Zhao to the combination of Small and Tanabe does not provide to previously cited features of Claim 10 that are deficient from the combination of Small and Tanabe. In particular, Applicants' amended Claim 10 is neither disclosed nor suggested by the references, taken separately or in combination in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components,*** as set forth in Applicants' amended Claim 10.

For reasons similar to those set forth above regarding amended Claim 10, Applicants' amended Claim 11 is neither disclosed nor suggested by the references. Applicants' amended Claim 11 is neither disclosed nor suggested by the references, taken separately or in combination in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass, 0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively,*** as set forth in Applicants'

amended Claim 11.

In view of the foregoing, Applicants respectfully submit that Claims 16-20, 22-26, 28 and 29 are patentable over the references and request that the rejection be reconsidered and withdrawn.

The rejection of Claims 10-14 under 35 U.S.C. 103(a) as being unpatentable over Morinaga et al. (U.S. 5,885,362, hereinafter referred to as “Morinaga”) and Tanabe is hereby traversed and reconsideration thereof is respectfully requested. Claims 10-14, as amended herein, are patentable over the references, taken separately or in combination.

Applicants’ Claims 10-14 are summarized above.

Tanabe is summarized above.

The cited art of Morinaga discloses a method for cleaning metal and glass surfaces using various hydroxys, urea and water. The cited reference discloses materials to remove etching residues and contamination such as particles, and does not suggest stripping resists or other organic layers with exposed metal.

Applicants’ Claim 10, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent*

which contains a hydroxylamine, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' amended Claim 10. Morinaga appears silent on making any use of a water soluble organic solvent or hydroxylamine. Tanabe uses a water soluble organic solvent, but makes no mention of using this with stripping a resist film. Accordingly, the references neither disclose nor suggest the feature of *a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a hydroxylamine, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' amended Claim 10.*

For reasons similar to those set forth regarding Claim 10, Applicants' Claim 11, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a hydroxylamine and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' amended Claim 11.*

For reasons similar to those set forth regarding Applicants' Claim 10, Applicants' Claim 12 is neither disclosed nor suggested by the references. Applicants' Claim 12, as amended

herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,*** as set forth in Applicants' amended Claim 12.

Applicants' Claim 13, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components,*** as set forth in Applicants' amended Claim 13.

Applicants' Claim 14, as amended herein, is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,*** as set forth in Applicants' amended Claim 14.

In view of the foregoing, Applicants respectfully submit that Claims 10-14 are patentable over the references and request that the rejection be reconsidered and withdrawn.

The rejection of Claims 16-20, 22-26, 28, and 29 under 35 U.S.C. 103(a) as being unpatentable over Morinaga, Tanabe, and Zhao is hereby traversed and reconsideration thereof is respectfully requested. Applicants respectfully submit that Claims 16-20, 22-26, 28, and 29 are patentable over the references, taken separately or in combination.

Claims 16-20 and 22-26 are summarized above.

Claims 28 and 29 depend from independent Claims 10 and 11. For reasons set forth above, Applicants' amended Claims 10 and 11, and claims that depend therefrom, are neither disclosed nor suggested by Morinaga and Tanabe. For reasons set forth below, Applicants further submit that combining these references with Zhao also neither disclose nor suggest Applicants' Claims 10 and 11, or claims that depend therefrom.

Morinaga, Tanabe, and Zhao are summarized above.

Applicants' Claim 16 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition*

containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants'

Claim 16. Morinaga and Zhao are silent on disclosing any use of a water soluble organic solvent. Tanabe discloses using a water soluble organic solvent, but discloses using this in a step performed to remove hydrofluoric acid remaining after forming a resist pattern and wet etching the resist, rather than to strip a resist film or the residue of dry etching. Accordingly, the references neither disclose nor suggest the feature of *a stripping method which comprises:*

forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 16.

For reasons similar to those set forth regarding Claim 16, Applicants' Claim 17 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides,*

dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components, as set forth in Applicants' Claim 17.

For reasons similar to those set forth regarding Claim 16, Applicants' Claim 18 is neither disclosed nor suggested by the references. Applicants' Claim 18 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants' Claim 18.*

For reasons similar to those set forth regarding Claim 16, Applicants' Claim 19 is also neither disclosed nor suggested by the references. Applicants' Claim 19 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl*

acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,
as set forth in Applicants' Claim 19.

For reasons similar to those set forth regarding Applicants' Claim 16, Applicants' Claim 20 is neither disclosed nor suggested by the references. Applicants' Claim 20 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film and an insulating film in this order; forming a resist film thereon; conducting dry etching with the resist film being used as a mask, to form, in the insulating film, dents reaching the metal film; then stripping the resist film and/or the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,* as set forth in Applicants' Claim 20.

For reasons similar to those set forth regarding Applicants' Claim 16, Applicants' Claim 22 is neither disclosed nor suggested by the references. Applicants' Claim 22 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides,*

dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, as set forth in Applicants Claim 22.

For reasons similar to those set forth regarding Applicants' Claim 16, Applicants' Claim 23 is neither disclosed nor suggested by the references. Applicants' Claim 23 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components*, as set forth in Applicants' Claim 23.

Applicants' Claim 24 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components*, as set forth in Applicants'

Claim 24.

Applicants' Claim 25 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components*, as set forth in Applicants' Claim 25.

Applicants' Claim 26 is neither disclosed nor suggested by the references, taken separately or in combination, in that the references neither disclose nor suggest *a stripping method which comprises: forming, on a semiconductor wafer, a metal film, a first insulating film and a second insulating film having desired openings; conducting dry etching with the second insulating film being used as a mask, to form, in the first insulating film, dents reaching the metal film; then stripping the residue of etching by using a stripper composition containing an anticorrosive agent which contains a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components*, as set forth in Applicants' Claim 26.

With regard to amended Claim 10, adding Zhao to the combination of Morinaga and Tanabe does not provide the previously cited features of Claim 10 that are deficient from the combination of Small and Tanabe. In particular, Applicants' amended Claim 10 is neither disclosed nor suggested by the references, taken separately or in combination in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components,*** as set forth in Applicants' amended Claim 10.

For reasons similar to those set forth above regarding amended Claim 10, Applicants' amended Claim 11 is neither disclosed nor suggested by the references. Applicants' amended Claim 11 is neither disclosed nor suggested by the references, taken separately or in combination in that the references neither disclose nor suggest ***a stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components, wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass, 0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively,*** as set forth in Applicants' amended Claim 11.

In view of the foregoing, Applicants respectfully submit that Claims 16-20, 22-26, 28 and 29 are patentable over the references and request that the rejection be reconsidered and withdrawn.

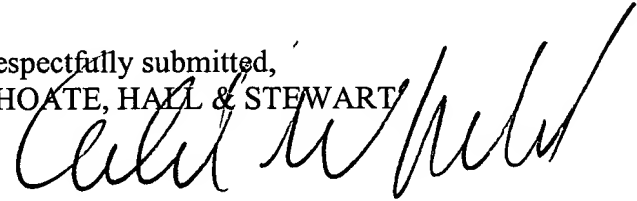
Based on the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4038.

December 27, 2002

Date

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Respectfully submitted,
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CLAIMS

Following are a set of clean, rewritten Claims in accordance with amendments made herein.

501
B1
10. (Twice Amended) A stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components.

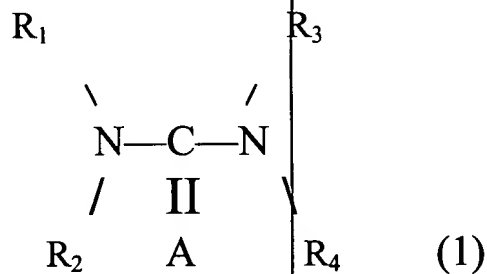
11. (Twice Amended) A stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, (c) a hydroxylamine, (d) water and (e) a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components,

wherein the amounts of the components (a), (b), (c) and (d) are 1 to 60% by mass, 0.1 to 20% by mass, 5 to 70% by mass and 2 to 40% by mass, respectively.

12. (Twice Amended) A stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,

wherein the component (a) is a compound represented by the following general formula

(1):



(R₁, R₂, R₃ and R₄ are each independently a hydrogen atom or an alkyl group having 1 to 3 carbon atoms; and A is an oxygen atom or a sulfur atom).

13. (Twice Amended) A stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, having a benzene derivative having at least two phenolic hydroxyl groups in the molecule, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones as essential components.

Original

14. (Twice Amended) A stripping method which comprises stripping a resist film on a semiconductor wafer having an exposed metal film, by using a stripper composition containing an anticorrosive agent which contains (a) urea or a urea derivative, (b) a hydroxy aromatic compound, and a water soluble organic solvent selected from the group including sulfoxides, dimethylformamides, dimethyl acetamides, glycols, glycol ethers, pyrrolidones, imidazolidinones, as essential components,

wherein the component (b) is a benzene derivative having at least two phenolic hydroxyl groups in the molecule having at least one compound selected from the group consisting of pyrogallol, hydroxyhydroquinone, fluoroglucinol, gallic acid and tannic acid.
